Qwest Foundation for Education
Competitive Sub-grant Application Assurance Sheet

Project Title: Science Gone Digital Amount of Request: $9992.00

District Name: Marsing Joint School District Number: #363

Name of Certificated Teacher (or "lead teacher" if more than one): Jim Eisentrager

Name of School currently teaching at: Marsing Middle School

Years taught in Idaho K-12 public education: 11 Years

Content area(s) that you are teaching in Idaho K-12 public education: 7th Grade Science and Social Studies

I certify that if I receive a Qwest Foundation for Education Grant –

- **I agree to create a video highlighting my project for the purposes of sharing best practices with other Idaho K-12 teachers.**
- **I agree to do one presentation on my project to other Idaho K-12 teachers before October 31, 2009.**
- **I agree to submit an electronic report to the Idaho State Department of Education before October 31, 2009.**

Superintendent Name (print) Harold Shockley	E-mail hshockley@marsingschools.org	Telephone 208.896.4111 x197
Signature		
Principal Name (print) Paul Webster	E-mail pwebster@marsingschools.org	Telephone 208.896.4111 x396
Signature		
Teacher or Lead Teacher (print) Jim Eisentrager	E-mail jeisentrager@marsingschools.org	Telephone 208.896.4111 x397
Signature		

Abstract
Science Gone Digital

In order for students to be prepared to understand technology and how it works, they need to be exposed to it as early as possible. Through the innovations made possible by this grant, students in my class will get the opportunity to use real scientific tools in the context of 7th grade scientific inquiry. By doing this, they will gain the knowledge and experience needed to carry into their academic careers. My project includes three areas, making the microscopic digital, digitizing environmental studies, and digitizing physiological measurement.

Making the microscopic digital will focus on the use of microscopes and the ability for students to see the microscopic world. A digital microscope added to the already functional supply of microscopes in the classroom, will allow for high quality modeling. Students will be able to see what they should be looking for, prior to their own experience so they won't be drawing pictures of the scratches on the cover slip.

In digitizing the environment, students will use *Vernier* probeware to examine and evaluate their environment. Our school is within walking distance of the Snake River in southwestern Idaho. Upstream from us the Snake River passes through hundreds of miles of farmland and other potentially harmful sites that, at least, seem like they might pollute the river. Students will engage in testing water quality themselves and seeing what effects the water quality has on microscopic life in the river.

The digitizing physiological measurement study will give students the probeware to evaluate chemical and physical reactions that take place in the human body as well as in the cells of plants and micro-organisms. The heart-rate monitors, blood-pressure monitors, O2 sensors, and CO2 sensors will be used to study exercise, human physiology, plant physiology and yeast physiology. All of these will record data in real time and will allow for analysis afterwards.

When students are engaged and excited about their learning I have found that they will remember it longer and apply the skills they use in that learning to other learning opportunities they encounter. Marsing Middle School is entering its third year of school improvement, according to our AYP status. While the science ISAT is not currently included in our AYP calculations, our science achievement is significantly lower than our student achievement in reading, language, or math. I believe that giving my students the opportunity to use real scientific instruments will help them to develop critical thinking and problem solving skills that will increase their understanding in science as well as moving us towards meeting our AYP goals in other academic areas.

Current Innovation Narrative

One of our school's key vision statements reads, "Students are actively engaged through important ideas, meaningful activities, real world connections, and cutting edge technology." I strive to give my middle school students every opportunity to use and interact with technology wherever possible. Nowhere has this been more prevalent than in the use of my interactive whiteboard (IWB) from *Promethean*. With the use of this whiteboard and many of the peripheral options that come with it, I have motivated students to be fully engaged and to interact with my lessons. I have taken three classes through *Promethean* that focus on engaging students with their products and I have reached a trainer level status. This allows me to be able to use the software and the IWB to its maximum potential. I use the *Activexpressions* that accompany the software for students' engagement the most. An *Activexpression* is a student response system that allows me to assess knowledge of students on virtually every level. Students respond to formal or on-the-fly questions in text, numeric, multiple-choice, sorts, and likert scales. With *Activexpressions* I can record students' responses, paste them to the IWB and have students manipulate and interact with their own responses. Students see technology in my classroom as embedded and not something that is separated or used for special lessons.

I see technology as a tool for students to examine their world and for them to use the technology to solve real world problems. For four years students in my classes have been using the *Lego Mindstorms NXT* robotics invention system that allows them to use their critical thinking and problem solving skills to think outside the box and solve simulated problems. For example, they are faced with a certain situation where a robot is needed to perform or mimic the functions of a human and they are required to problem-solve the situation, build a functioning robot that will meet the needs of the situation and, finally, to present their functional and working invention to the class.

Students in my science class use a wireless mobile laptop lab to regularly take part in virtual labs that accompany our standards-based science curriculum. These virtual labs present students with objective based problems, provide a guide to help them solve the problem and an interactive set-up that is engaging and fun, while pushing the students towards rigorous learning goals. The virtual lab provides the opportunity for students to type up a lab report and answer questions that range from the bottom of Bloom's Taxonomy to the top. They offer the opportunity to do labs that would be too messy, dangerous, expensive, or time-consuming to take on in a middle school classroom.

Through the use of technology that has already been implemented in my class, I have seen student performance climb higher and higher every year. Using regular assessments as well as alternative assessments has proven to me that the way I use technology to support my teaching is having an impact on student learning.

Over my career as a teacher, I have always recognized the importance that technology is playing in the lives of my students. I have always strived to make sure that students are exposed to the latest most updated forms of technology possible. Because of this, students in my classroom see technology as integrated and a seamless part of their education. The technology I have now in my class is the perfect base to support and enhance the opportunities that my students will have to engage with real scientific tools if awarded with this grant.

Project Narrative: Science Gone Digital

One of our school's vision statements is "Students are actively engaged through important ideas, meaningful activities, real world connections, and cutting edge technology." This project is designed to support and enhance learning at Marsing Middle School through the purchase of a high quality digital microscope and the integration of scientific probeware in my classes. My proposed project covers three areas, making the microscopic digital, digitizing the environment and digitizing physiological measurement.

"Making the microscopic digital" will focus on the use of microscopes and the ability for students to see the microscopic world. A digital microscope added to the already functional supply of student microscopes in the classroom will allow me to project onto my Interactive White Board what they should be looking for, prior to their own experience. This will allow for high quality modeling, so they won't waste time and energy drawing pictures of the scratches on the cover slip.

In "digitizing the environment," students will use scientific probeware to examine and evaluate their environment. Our school is within walking distance of the Snake River in southwestern Idaho. During much of its course, the Snake River is surrounded by farmland and several potential environmental hazards. There is at least a perception that harmful things could be entering the river upstream. Our students will learn to test the water quality for themselves. They will find out what effect the water quality has on microscopic life in the river.

The "digitizing physiological measurement" project will give students the probeware to evaluate reactions that take place in the human body as well as in the physiology of plants and micro-organisms. The *Vernier* heart-rate monitors, blood-pressure monitors, O2 sensors, and CO2 sensors will be used to study exercise, human physiology, plant physiology and yeast physiology. All of these probes will record data in real time and will allow for analysis afterwards. This can be done in the laboratory or out in the field with laptops, graphing calculators, or pda's.

I will be the primary project team member. I will be responsible for creating lessons that are engaging and relevant to the purchased materials. I will create lessons that are based on Idaho State Curriculum Standards and are supported by National Science Standards. I will use the technology that is currently present in my room, such as an interactive white board, *ActivStudio*, and the *ActivExpressions* (a student response system) to support my teaching. Other team members include the other science teacher in our building. He is responsible for teaching science to our 6th and 8th graders. The probeware will support systems he already has available in his class to provide a higher level of student access to the new technology. The third most important member of the team would be my building administrator. As someone who is focused on engagement and student achievement, especially when it comes to math and science, he will support me with ideas and funds to extend the use of the microscope and probeware beyond the walls of our school. He will allow for us to travel to various areas near our town where students can have access to water samples like the Snake River or Claytonia Ponds.

Given the technology I already am actively using in my classroom, and given the proposed project budget, these three projects are clearly feasible. I am eager to begin using the new tools. There won't be a need for extra equipment beyond what is already available in my room. Both the other science teacher and I are eager implementers of technology. All of the funds in this project will be invested in equipment that can be used for many years into the future. The probeware and interfaces are built to last and can be upgraded for future iterations of windows. The probeware and computer interfaces actually have quite low minimum specs and can even function on low-end

PC hardware. If Qwest is looking at a good bang-for-the-buck then this project is a best fit. It will be used to purchase equipment that is high quality and will last for many years. It will also serve as a foundation for other grant or district funded projects in the future, adding additional probes to our collection.

Our school and district have been very supportive of innovative uses of technology that lead to higher student achievement and learning. The school and district administration is supportive of this initiative. They desire to place technology in places where it will be used the most and will have the greatest impact on student learning. I have been fortunate to have access to many technological tools in my classroom. I have discovered many innovative ways to use them and constantly am reinventing the way instruction looks to better serve my students.

This project is necessary to increase student achievement in science and in other subjects. Marsing Middle School is entering its third year of school improvement, based on our ISAT scores in reading, math, and language. While the science ISAT is not currently included in our AYP calculations, our science achievement is significantly lower than our student achievement in any of those 3 subjects. My current students will be required to pass the science ISAT in order to graduate from high school.

When students are engaged and excited about their learning, I have found that they will remember what they learned longer and will be more likely to apply the skills they use in that learning to other learning opportunities they encounter. I believe that giving my students the opportunity to use real scientific instruments will help them to develop critical thinking and problem solving skills that will increase their understanding as well as moving us towards meeting all of our AYP goals. This project will not only make science more digital but it will make science more real for my students.

Project Scope and Sequence

Winter 2009

- Purchases of equipment will be made and delivered by March 2008.
- Planning and implementation of lessons begins so that equipment can be used immediately when in arrives.

Spring 2009

- Using the newly purchased equipment, students will participate in the "Digitizing Physiological Measurement" studies. This will include using the probeware to study the human body.
- As the school year closes out, students will use the purchased equipment in the "Digitizing the Environment" study. They will walk to the Snake River, test water quality and bring results back to class for analysis and study

Summer 2009

- Planning and development of curriculum using IWB and *Promethean* software
- Revision of "Digitizing Physiological Measurement" and "Digitizing the Environment" curriculum.

August/September 2009

- "Making the Microscopic Digital" will begin the study of the new school year. Students will use the microscopes and the digital microscope to study cells in plants and animals, as they learn about cell processes and cell reproduction.

- Grant report, video, and presentation completion

Ongoing

- Student assessment and AYP evaluation ongoing

Budget Narrative

The purchased materials will enable my classroom to move beyond using technology for instruction and classroom demonstration and interaction. It will enable us to put digital scientific tools in the hands of students and to place their work in front of the class for demonstration and analysis.

Making Everything Visual: The largest equipment purchases will include a new digital projector, replacing the older model that has been in my room for the past 5 years. This will allow for a brighter picture. Replacing the bulbs on this model has become as costly as buying a new projector. The budgeted cost of this projector will be $1000.

Making the Microscopic Digital: Our science class spends a significant amount of time on microscopes. The proper use of a microscope is a bit of a mystery to middle school kids. It is hard for them to tell when they are looking at cells or at their eyelashes. The digital microscope from Motic will allow us to demonstrate on the projector what they see on the microscope.

Digitizing Environmental Study and Digitizing Human Physiological Measurement: These two projects involve building units of study around environmental studies and around human physiology that require the use of scientific instruments (probeware) that interface with the computer. In the environmental study project the major focus will be on water quality. The Snake River flows through our town and is surrounded by farmland as well as other potential environmental hazards. The probeware and interfaces made by *Vernier* will allow us to measure the essential elements of water quality in the Snake River and to analyze all of them back in the classroom. The second project involving the *Vernier* probeware focuses on physiological measurement. The heart-rate monitors, blood-pressure monitors, O2 sensors, and CO2 sensors will be used to study exercise, human physiology, plant physiology and yeast physiology. All of these will record data in real time and will allow for analysis afterwards. This project will put real equipment into the hands of kids and allow them to do real thinking like scientists.

Budget Spreadsheet

Activity	Materials and Supplies	Capital Objects	Quantity	Price Per Unit	Total
Making Everything Visual		Digital Projector	1	$1,000.00	$1,000.00
Making The Microscopic Digital	Motic Digital Microscope		1	$400.00	$400.00
Digitizing Environmental Study	Vernier LabPro		8	$220.00	$1,760.00
	Stainless Steel Temperature Probe		8	$30.00	$240.00
	pH Sensor		8	$79.00	$632.00
	Dissolved Oxygen Sensor		1	$205.00	$205.00
	Conductivity Probe		1	$93.00	$93.00
	Turbidity Sensor		1	$109.00	$109.00
	Nitrate Ion-Selective Electrode		1	$175.00	$175.00
	Ammonium Ion-Selective Electrode		1	$175.00	$175.00
	Calcium Ion-Selective Electrode		1	$175.00	$175.00
	Chloride Ion-Selective Electrode		1	$175.00	$175.00
	Colorimeter		4	$114.00	$456.00
	Flow Rate Sensor		1	$129.00	$129.00
Digitizing Physiological Measurements	Exercise Heart-Rate Monitor		8	$91.00	$728.00
	Blood Pressure Sensor		8	$130.00	$1,040.00
	O2 Gas Sensor		8	$188.00	$1,504.00
	CO2 Gas Sensor		4	$249.00	$996.00
				Total	$9,992.00